UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/002,381	10/31/2001	Richard P. Tarquini	10017556-1	2797

7590 12/13/2004	EXAMINER
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ART UNIT	PAPER NUMBER
2162	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

	Application No.	Applicant(s)
Office Action Summary	10/002,381	TARQUINI, RICHARD P.
	Examiner	**Art Unit**	
	Cam Y T Truong	2162	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM
THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 June 2004*.
2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.
3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.
6)☒ Claim(s) *1-20* is/are rejected.
7)☐ Claim(s) _____ is/are objected to.
8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.
10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1.   Claims 1-20 are pending in this Office Action.

Applicant's arguments filed 6/17/2004 have been fully considered but they are

not persuasive.

Applicant argued that Chang does not teach "a plurality of linked root nodes".

Chang teaches B-tree has leaf pages are linked to parent node pages (col. 7, lines 45-

59).

Applicant argued that Chang does not teach "each leaf node represents a

character in a signature". Chang teaches the second level of the parent node 58 is

presented as branch having one or more leaf nodes 62 linked to one another. Each leaf

node represents a signature, which is represented as a character (a set of binary

number) (fig. 15A, col. 2, lines 10-20; col. 7, lines 63-65).

Applicant argued that Chang does not teach all the claimed limitation of claim 11.

Chang teaches the claimed limitations:

"determining a hash value for a target signature" as query signatures QS are

compared against leaf signatures S1. Wherein a signature is computed by using hash

function. Thus, before using query signatures QS to compare against leaf signatures

S1, the system has to determine a hash value for each query signature QS. Each query

signature of query signatures QS is represented as a target signature (col. 12, lines 20-

25; col. 6, lines 25-30);

"said branch along with said root node representing at least one signature of said plurality of signatures" as combinatorial parent signatures CS2, CS3 are stored in it non-leaf pages (fig. 15A, col. 7, lines 62-65),

"said branch having one or more leaf nodes linked hierarchically to one another" as shown in fig. 15A, the first branch of the second level of the B-tree has a leaf node that is linked hierarchically to another three leaf nodes below it (col. 14, lines 50-60),

"each leaf node representing an element of said at least one signature" as since leaf signatures S1 are stored in the B-tree's leaf pages; thus, each leaf page is represented as an element of at least one signature (col. 7, lines 62-65)

"and traversing only said branch to find a match between said at least one signature and said target signature" as when comparing query signatures against leaf signatures S1 in a B-tree, the system has to traverse only branch to find matching (col. 11, lines 17-45).

Chang does not explicitly teach the claimed limitation "determining a branch associated with a root node of said lexical search tree data structure corresponding to said hash value".

However, Kadshevich teaches that stem lexicon 16 includes compacted letter tries including nodes 30, each one representing a different character of a stem formed in a trie. Associated with each node 30 is a data structure 32, which contains information about that node and the nodes, which are connected to it on the next lower level of the tree. Since every character in the input word corresponds to hash value,

thus, each branch or each level of the tree associated with a root node corresponds to hash value too (col. 16, lines 50-60; col. 20, lines 40-67).

It would have been obvious to a person of an ordinary skill in the art at the time the invention was made to apply Kadshevich's teaching of stem lexicon 16 includes compacted letter tries including nodes 30, each one representing a different character of a stem formed in a trie. Associated with each node 30 is a data structure 32, which contains information about that node and the nodes, which are connected to it on the next lower level of the tree. Since every character in the input word corresponds to hash value, thus, each branch or each level of the tree associated with a root node corresponds to hash value too into Chang's system improves the completeness of results in document and/or text searches and detect the occurrence of any of the words from a group of search words.

For the above reason, examiner believed that rejection of the last office action was proper.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   Claims 1-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Chang et al (or hereinafter "Chang") (USP 5319779) in view of Kadashevich et al (or

hereinafter "Kadashevich") (USP 5369577).

As to claim 1, Chang teaches the claimed limitations:

"a plurality of linked root nodes" as the three-level B-tree has a root page 58 that

is pointed by pointer to another root page of second level. Root page 58 and another

root page of the second level are presented as linked root nodes (fig. 15A, col. 7, lines

45-49; col. 14, lines 58-60);

"at least one branch linked to at least one of said plurality of root nodes" as the

second level of the three-level B-tree is linked to leaf nodes Zappe and Zilles of Mohan

root. The second level of the three-level B-tree is called a branch of the three-level B-

tree (fig. 15A, col. 14, lines 58-60),

"each branch along with the root node to which it is linked representing at least

one of a plurality of signatures" when query signature QS 55 is compared against the

non-combinatorial second-level signature S2 of the second entry of the root page,

another match is indicated and the respective child page is retrieved. The second level

of the second entry of the root page is linked to signature S2 and signature QS 55 (col.

15, lines 63-66),

"and each branch having one or more leaf nodes linked hierarchically to one

another, each leaf node representing a character in a signature" as the second level of

the parent node 58 is presented as branch having one or more leaf nodes 62 linked to

one another. Each leaf node represents a signature, which is represented as a character (a set of binary number) (fig. 15A, col. 2, lines 10-20; col. 7, lines 63-65).

Chang does not explicitly teach the claimed limitation "a first character of each signature being represented by one of said plurality of root nodes". Kadashevich teaches that each nodes 30 of the trie is represented a different character of a stem found in the trie. Each different character, which is each signature, is presented as a first character. Each node 30 of trie can be represented as root nodes (col. 16, lines 50-55).

It would have been obvious to person of an ordinary skill in the art at the time the invention was made to apply Kadashevich's teaching of each nodes 30 of the trie is represented a different character of a stem found in the trie in order to detect the occurrence of any of the words from a group of search words, the group of search words including the input word and the first set of words and to generate a index containing the subset of words.

As to claim 2, Chang teaches the claimed limitation "a twig linked to one of said leaf nodes" as since the system has a three_level combinatorial B-tree; thus the system has included a twig linked to one of leaf nodes (fig. 15A) "and representing a substring of a second signature of said plurality of signatures" as leaf signatures S1 are stored in the B-tree's leaf pages. Each leaf signature that has a substring i.e., 10110000, is represented as each second signature (col.7, lines 63-65; col. 2, lines 5-20), "said second signature having at least the same first character as said first signature and said

first and second signatures diverging from one another at said leaf node to which said

twig is linked" as the second level combinatorial signatures CS2 on a non-leaf page

themselves form a group and have exactly one parent signature (col. 5, lines 10-15).

As to claim 3, Chang teaches the claimed limitations:

"said twig node being at the same level as said leaf node to which said twig is

linked" as since the system includes the three_level combinatorial B-tree; thus, the this

three_level combinatorial B-tree has to include a twig node being at the same level as

said leaf node to which the twig is linked (fig. 15A)

"and one or more leaf nodes, each leaf node representing a character of said

substring" as leaf signatures S1 are stored in the B-tree's leaf pages. Each leaf

signature has a substring i.e., 10110000 (col.7, lines 63-65; col. 2, lines 5-20).

Chang does not explicitly teach the claimed limitation "a twig node representing

a first character of said substring". Kadashevich teaches that each nodes 30 of the trie

is represented a different character of a stem found in the trie. Each different character,

which is each signature, is presented as a first character. Each node 30 of trie can be

represented as root nodes (col. 16, lines 50-55).

It would have been obvious to person of an ordinary skill in the art at the time the

invention was made to apply Kadashevich's teaching of each nodes 30 of the trie is

represented a different character of a stem found in the trie in order to detect the

occurrence of any of the words from a group of search words, the group of search

words including the input word and the first set of words and to generate a index

containing the subset of words.

As to claim 4, Chang teaches the claimed limitation "wherein each of said

plurality of signatures comprises a string of characters" as (col. 2, lines 5-20).

As to claim 5, Chang teaches the claimed limitation "wherein the number of said

root nodes is equal to the number of characters in a character set available to represent

said plurality of signatures" as (fig. 15A, col. 7, lines 63-67).

As to claim 6, Chang does not explicitly teach the claimed limitation "the set of

ASCII characters". Kadashevich sum of the values in ASCII code (mod a) of each

character in the suffix (col. 21, lines 13-15).

It would have been obvious to a person of an ordinary skill in the art at the time

the invention was made to apply Kadashevich's teaching of sum of the values in ASCII

code (mod a) of each character in the suffix (col. 21, lines 13-15) to Chang's system in

order to generate a index containing the subset of words.

As to claim 7, Chang teaches the claimed limitation "each root node comprising a

hash value for the character represented by said root node" as (fig. 15A, col. 13, lines

60-67; col. 14, lines 1-30).

As to claim 8, Chang teaches the claimed limitation "a pointer to a leaf node of said one or more leaf nodes if a first character of any of said plurality of signatures corresponds to said root node" as (fig. 15A, col. 9, lines 45-50).

As to claim 9, Chang teaches the claimed limitation "each leaf node having only one other leaf node directly linked to it at the next lower level" as (fig. 15A).

As to claim 10, Chang teaches that "a plurality of twigs linked to one of said leaf nodes, each twig of said plurality of twigs representing a substring of a different signature of said plurality of signatures" as the first node and the second node of parent node 58 are presented as twigs linked to one of leaf nodes at the third level of the B-tree. Leaf signatures S1 are stored in the B-tree's leaf page. These leaf signatures are different from parent signatures (fig. 15A, col. 14, lines 58-65; col. 7, lines 63-67).

As to claim 11, Chang teaches the claimed limitations:

"determining a hash value for a target signature" as query signatures QS are compared against leaf signatures S1. Wherein a signature is computed by using hash function. Thus, before using query signatures QS to compare against leaf signatures S1, the system has to determine a hash value for each query signature QS. Each query signature of query signatures QS is represented as a target signature (col. 12, lines 20-25; col. 6, lines 25-30);

"said branch along with said root node representing at least one signature of said plurality of signatures" as combinatorial parent signatures CS2, CS3 are stored in it non-leaf pages (fig. 15A, col. 7, lines 62-65),

"said branch having one or more leaf nodes linked hierarchically to one another" as shown in fig. 15A, the first branch of the second level of the B-tree has a leaf node that is linked hierarchically to another three leaf nodes below it (col. 14, lines 50-60),

"each leaf node representing an element of said at least one signature" as since leaf signatures S1 are stored in the B-tree's leaf pages; thus, each leaf page is represented as an element of at least one signature (col. 7, lines 62-65)

"and traversing only said branch to find a match between said at least one signature and said target signature" as when comparing query signatures against leaf signatures S1 in a B-tree, the system has to traverse only branch to find matching (col. 11, lines 17-45).

Chang does not explicitly teach the claimed limitation "determining a branch associated with a root node of said lexical search tree data structure corresponding to said hash value".

However, Kadshevich teaches that stem lexicon 16 includes compacted letter tries including nodes 30, each one representing a different character of a stem formed in a trie. Associated with each node 30 is a data structure 32, which contains information about that node and the nodes, which are connected to it on the next lower level of the tree. Since every character in the input word corresponds to hash value,

thus, each branch or each level of the tree associated with a root node corresponds to

hash value too (col. 16, lines 50-60; col. 20, lines 40-67).

It would have been obvious to a person of an ordinary skill in the art at the time

the invention was made to apply Kadshevich's teaching of stem lexicon 16 includes

compacted letter tries including nodes 30, each one representing a different character of

a stem formed in a trie. Associated with each node 30 is a data structure 32, which

contains information about that node and the nodes, which are connected to it on the

next lower level of the tree. Since every character in the input word corresponds to

hash value, thus, each branch or each level of the tree associated with a root node

corresponds to hash value too into Chang's system improves the completeness of

results in document and/or text searches and detect the occurrence of any of the words

from a group of search words.

As to claim 12, Chang teaches the claimed limitation "determining a first element

of said target signature; and determining a hash value for said first element" as (col. 8,

lines 5-25).

As to claim 13, Chang does not explicitly teach the claimed limitation "said hash

value being the ASCII code for said first element". Kadashevich sum of the values in

ASCII code (mod a) of each character in the suffix (col. 21, lines 13-15).

It would have been obvious to a person of an ordinary skill in the art at the time

the invention was made to apply Kadashevich's teaching of sum of the values in ASCII

code (mod a) of each character in the suffix (col. 21, lines 13-15) to Chang's system in

order to generate a index containing the subset of words.

As to claim 14, Chang teaches the claimed limitation "comparing successive

elements of said target signature with successive elements of said at least one

signature stored in successive leaf nodes of said one or more leaf nodes so long as

said successive elements of said target signature match said successive elements of

said at least one signature" as in order to compare a combinatorial query signature QCS

against a stored parent second or higher level combinatorial signature CS2, CS3, etc.,

we use an algorithm for quickly comparing any two signatures. To compare signatures

we bit-AND the signatures with each other and compare the resulting bit-string with the

original combinatorial query signature QCS. If the two are identical, the query and data

signatures match and the child signatures (col. 10, lines 60-67).

As to claim 15, Chang teaches the claimed limitation "determining a twig

associated with said branch at a point of divergence between said at least one signature

and said target signature, said twig representing a terminating substring of a second

signature of said plurality of signatures; and traversing said twig to find a match

between a terminating substring of said target signature and said terminating substring

represented by said twig" as fig. 5, searches signatures in a B-tree given a query which

contains field values, words or substrings connected by Boolean and operator. The

procedure returns all records, which produce an exact match. The Do-until loop from

line 508 to 573 causes each third-level signature CS3 is tested against the

combinatorial query signature QCS on line 512. Line 514 contains the test used when

third-level signature CS3 indicates that the child signature group consisting of second-

level signatures CS2 must be searched. In line 516, the B-tree child page associated

child-page-ID is retrieved when the signature test of line 514 is successful. The Do-

Until loop between lines 524-566 contains similar logic to search the next level of

signatures. Each second-level signature CS2 is tested on line 528. When this test is

successful, the child-page-ID associated with that second-level signature CS2 is used to

retrieve the leaf B-tree page containing leaf signatures S1. On lines 544-554, if the

query's query signature QS matches a leaf signature S1, corresponding data record is

retrieved using the stored TID and is precisely examined using a standard string match

algorithm. When query's search criteria are exactly met by values in the record, the

record is return. The above information shows that this B_tree has included a twig

associated with said branch at a point of divergence between said a leaf signature and

said query signature to match a leaf signature and query signature after traversing the

B-tree (col. 11, lines 45-67; col. 12, lines 1-10).

As to claim 16, Chang teaches the claimed limitation "comparing successive

elements of said terminating substring of said target signature with successive elements

of said terminating substring of said second signature represented by said twig so long

as said successive elements match" as (col. 11, lines 45-67; col. 12, lines 1-10).

As to claim 17, Chang teaches the claimed limitations:

"setting a current node pointer to point to a leaf node of said one or more leaf

nodes" as (fig. 15);

"setting a target signature pointer to point to an element of said target signature"

as in response to a value of said leaf node pointed to by said current node pointer being

equal to a wild card character and a value of the element pointed to by said target

signature pointer being equal to a value of the next leaf node following the leaf node

pointed to by said current node pointer" as (col. 14, lines 60-68; col. 14, lines 1-25),

"updating said current node pointer to point to a leaf node following said next leaf node"

as (col. 7, lines 45-60).

4.   Claims 18-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over

Kadashevich et al (or hereinafter "Kadashevich") (USP 5369577).

As to claim 18, Kadashevich teaches the claimed limitation:

"allocating a plurality of root nodes, one for each distinct element of said plurality

of signatures" as each node A, E, I is represented by a different character of a stem

found within the trie. A stem includes a word. A word contains one or more character.

The applicant defined that a signature is represented as a character string. A character

string comprises of one or more character. Thus, a stem is presented as signature, a

character is presented as a substring of stem (col. 16, lines 45-58);

"determining an index value for a signature of said plurality of signatures" as if

the stem is abstract, a base index of 0, or 1 otherwise (col. 44, lines 50-51);

"determining a status of a root node corresponding to said determined index

value" as if the current class represents the root suffix of an abstract stem, Get.sub.--

records calls itself using the word found in the word field of the base.sub.-- index of the

current history and a pointer to the children of the current class (step 1188). This

information shows that the system determines a status of root node corresponding to

word field of the base.sub—index. The word field is represented as value of index (col.

54, lines 5-10), said root node being selected from said plurality of root nodes and

representing a first element of said signature" as nodes 30 are presented as root nodes

is represented by a character of stem found in the trie. In this case, a stem is

presented as signature, a character is presented as a first element of stem (col. 16,

lines 45-58);

"creating a branch for said root node if said root node has no existing branch" as

a separate stem.sub.-- node is created for each of the CC.sub.-- nodes generated in

step 525 and the current stem. This information implies when creating a stem.sub-

node for each CC.sub-node, the system creates a new branch for each CC.sub-node.

This information implies that each CC.sub-node has no existing branch (col. 34, lines

60-63), "said branch having one or more leaf nodes linked hierarchically to one

another" as (col. 4, lines 64-68), "each successive leaf node representing a successive

element of said signature" as nodes 30 are presented as root nodes is represented by

a character of stem found in the trie. In this case, a stem is presented as signature, a

character is presented as a first element of stem (col. 16, lines 45-58);

"e) creating a twig for said root node if said root node has an existing branch" as

creating a stem.sub node for each of the CC.sub.—nodes (col. 34, lines 60-63) "said

twig linked to one of said leaf nodes" as (col. 4, lines 65-68), "representing a substring

of said signature" as each node 30 is represented by a different character of a stem

found within the trie. A stem is presented as signature, a character is presented as a

substring of stem (col. 16, lines 45-58), "the first element of said substring being

represented by a twig node linked to said one of said leaf nodes" as shown in fig. 16,

stem lexicon 16 includes compacted letter tries including nodes 30, each one

representing a different character of a stem found within the trie. A stem includes a

word i.e., permiss (col. 16, lines 45-58).

Kadashevich does not explicitly teach the claimed limitation "repeating steps (b)

through (e) for each signature of said plurality of signatures". However, Kadashevich

teaches determining base index value for stem, representing a different character of a

stem found within the trie for each node, creating a stem.sub-node for each CC.sub-

node linking nodes in a tree as discussed above. The above information indicates that

it is obvious to repeat this step for each stem of a plurality of stem. A stem is

represented as a signature.

It would have been obvious to a person of an ordinary skill in the art at the time

the invention was made to apply Kadashevich's teaching of determining base index

value for stem, representing a different character of a stem found within the trie for each

node, creating a stem.sub-node for each CC.sub-node linking nodes in a tree in order to

detect the occurrence of any of the words from a group of search words, the group of

search words including the input word and the first set of words and to generate a index

containing the subset of words.

As to claim 19, Kadashevich teaches the claimed limitations:

"determining a first element of said signature" as (col. 16, lines 45-55);

"determining an ASCII code for said first element" as sum of the values in ASCII

code (mod a) of each character in the suffix (col. 21, lines 13-15).

As to claim 20, Kadashevich teaches the claimed limitation "the location of said

one of said leaf nodes from which said twig diverges" as leaf nodes such as S 30, D 30

is located under node A 30 (fig. 16).

Conclusion

5.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Fulton et al (US 5799184)

Bernzott et al (US 5436983)

6.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

Contact Information

7.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cam Y T Truong whose telephone number is (571) 272-4042. The examiner can normally be reached on Monday to Firday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Breene can be reached on (571) 272-4107. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Cam-Y Truong
12/8/2004

SHAHID ALAM
PRIMARY EXAMINER